

The Joint Tactical Radio System – Reloaded

The Joint Program Executive Officer Joint Tactical Radio System (JPEO JTRS) outlines an incremental approach to build software-programmable radios that will transform communication capabilities for troops on the ground, sea and in the air ...

By Sharon Anderson and Steven A. Davis

Dennis Bauman, JPEO JTRS, has the chartered financial, technical and directive authority to oversee development of JTRS through low rate initial production. He is the only Joint PEO that reports directly to a senior decision-maker in the Office of the Secretary of Defense; Bauman's boss is Ken Krieg, the Under Secretary of Defense for Acquisition, Technology and Logistics.

Bauman is using this authority to deliver JTRS communications capabilities to the warfighter at realistic cost, schedule and technical risk.

It should also be noted that Bauman is "dual-hatted." He is the Navy's PEO for Command, Control, Communications, Computers, Intelligence and Space programs.

Four Goals

"Reloading" JTRS is all about completing four strategic goals Bauman set for the program last spring: (1) Assess the status of the total program; (2) Develop and gain approval for realistic requirements and a budget going forward; (3) Implement an acquisition strategy to achieve the requirements within budget and; (4) Create an enduring "joint" organization that balances Service equities with DoD enterprise needs.

The JPEO's priority was to complete the first two goals in the

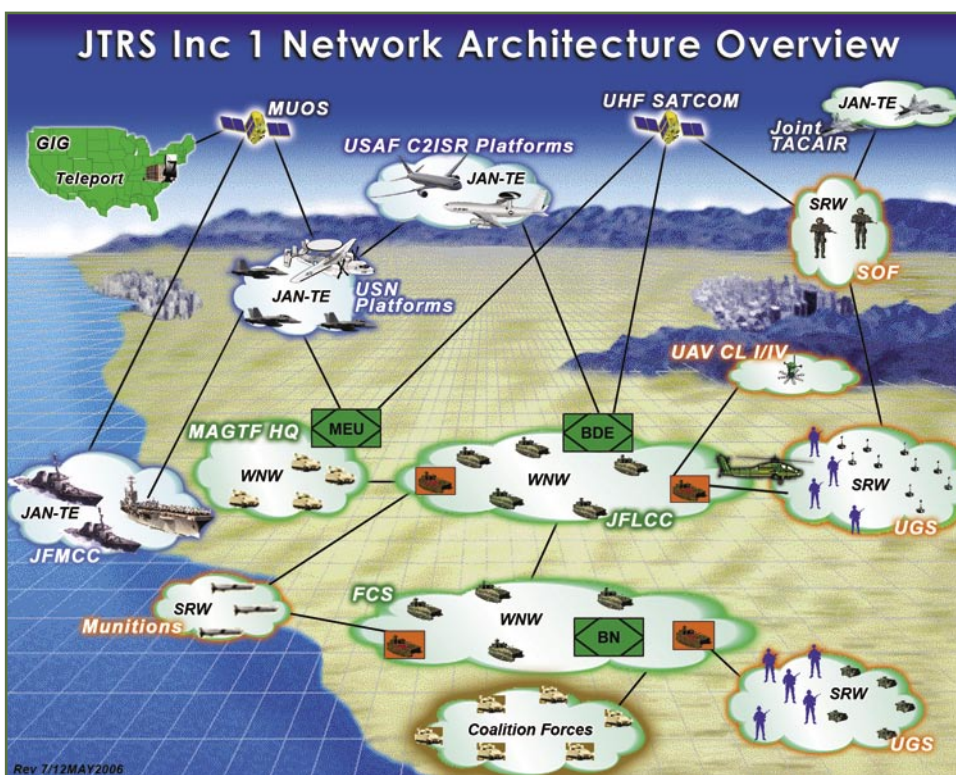
first year. Appointed JPEO in March 2005, he completed the second goal by mid-March 2006 with a Joint Requirements Oversight Council Memo signed by the Vice Chairman of the Joint Chiefs of Staff. The memo "locks in" — sets — realistic requirements funded in the President's FY 2007 Budget.

Bauman continues to move aggressively to complete the final two goals for the program. Under Secretary Krieg signed direction at the end of March 2006 approving the "Increment 1" development strategy for JTRS. Increment 1 is a significant change to an earlier acquisition strategy plagued by reported "requirements creep." Increment 1 reduces from 32 to 9 the number of waveforms for JTRS radios. It also reduces from 26 to 13 the number of form factors, and reduces the number of channels in some form factors.

Dennis Bauman on "What is JTRS? Why is it important?"

The transformational efforts of DoD's architecture depends on the information infrastructure called the Global Information Grid (GIG). Without a capability like JTRS, the GIG's transformational networking would halt at the command center level, unable to extend to the actual mobile warfighters. Figure 1 illustrates JTRS Increment 1 Network Architecture Overview.

JTRS is critical to serving as the last tactical mile connecting the warfighter on the ground into the networking capabilities that are delivered through the GIG. Under the newly revised requirements, budget, and schedule established for the program, JTRS will provide the mobile, ad hoc networking capability that is essential to realizing DoD's transformational goals for the warfighter.



"Neither the JPEO nor the DoD has given up on the full set of requirements for JTRS. Increment 1 is what we're going to deliver with the funding in the FY 2007 President's Budget, understanding that there will be subsequent Increments delivered later," Bauman said.

Lastly, Bauman is proposing a governance, or decision-making model, to create and sustain a truly joint organization. The goal is to address individual Service requirements for mobile ad hoc networking with an enterprise approach to acquisition and engineering practices that would enable effective leveraging of efforts across the JTRS product lines.

The governance model is moving forward. Under Secretary Krieg testified to the House and Senate Armed Services Committees April 5, 2006, citing JTRS as the pilot program he will use to streamline the decision-making process for

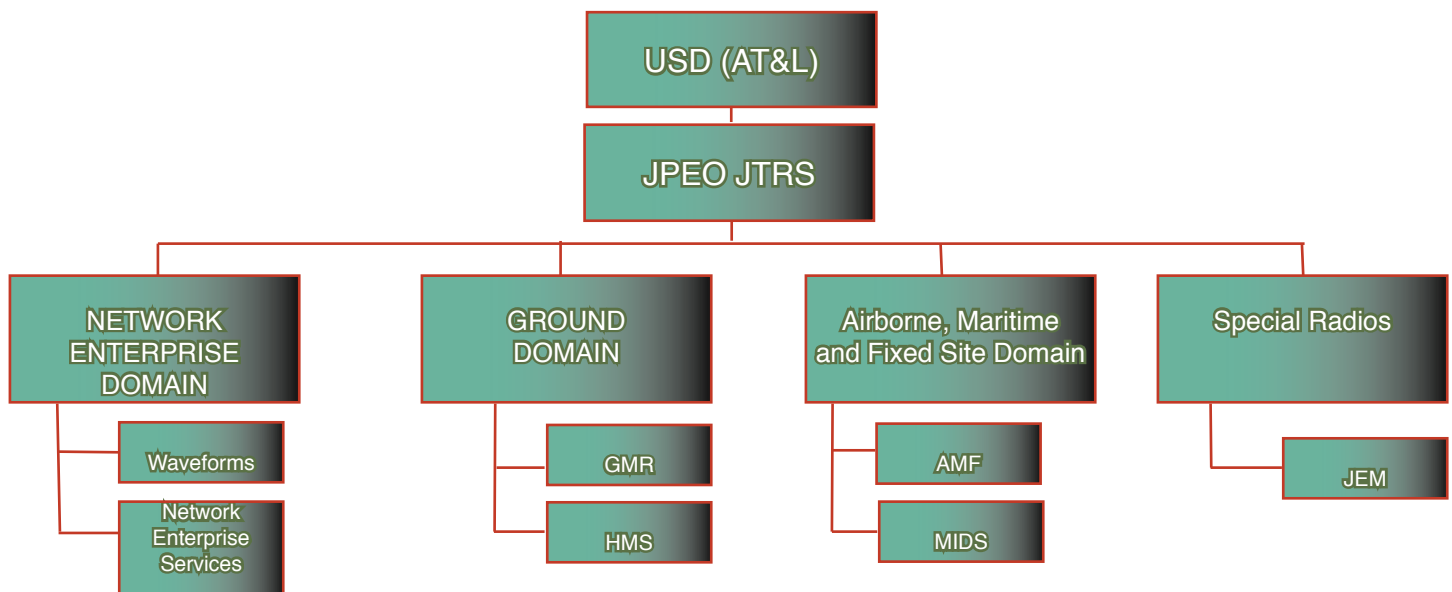


Figure 2. JTRS Organizational Structure

major weapons programs. The February 2006 Quadrennial Defense Review Report highlighted how the JTRS restructuring exemplified a collaborative approach between the joint warfighter acquisition and resource communities. The Report called for other joint programs to follow this collaborative approach.

Assessing the Status of the Total JTRS Program

In April 2005, the Joint Program Executive Officer technical and engineering staff began an assessment of the program with an extensive group of independent subject matter experts to take a close look at the JTRS product lines. The JPEO's major findings indicated that the program's requirements had fundamentally changed.

"When JTRS started, it was to be a legacy radio replacement program. Over time it had changed into a mobile, ad hoc networking capability to accomplish DoD's transformational goals. The requirements changed significantly without a corresponding adjustment in the budget or the acquisition strategy," Bauman explained.

What is a waveform?

A waveform is the entire set of radio and/or communications functions that occur from the user input to the radio frequency output and vice versa. JTRS waveform implementation consists of a Waveform Application Code, Radio Set Devices and Radio System Applications.

Originally, there were 32 JTRS waveforms which have since been reduced to the following 9.

- Wideband Networking Waveform (WNW)
- Soldier Radio Waveform (SRW)
- Joint Airborne Networking-Tactical Edge (JAN-TE)
- Mobile User Objective System (MUOS)
- SINCGARS
- Link-16
- EPLRS
- High Frequency (HF)
- UHF SATCOM

Secondly, there were information assurance challenges when transitioning from legacy radio replacement to a mobile networking capability. The National Security Agency (NSA) took a closer look at the vulnerabilities of mobile, ad hoc networking in a mobile ground unit, which had the potential to fall into the hands of an adversary.

The NSA recommended signifi-

cant changes to the security vulnerability requirements of the architecture. Unfortunately, these recommended changes for mitigating vulnerabilities increased cost and schedule. Contractors had already delivered engineering development models under architecture requirements that differed from the NSA recommendations.

In July 2005, the JPEO reported to senior DoD leadership the research and development price tag alone for the current JTRS program would total \$6 billion.

"That was an unacceptable high cost to the DoD leadership, and they directed us to complete capability trade-offs over August. We needed to deliver on meaningful warfighter requirements. However, we needed to deliver capability with moderate cost, schedule and technical risk," Bauman said.

Setting Requirements and a Realistic Budget

The JPEO, working with the Joint Staff, provided a number of trade-offs in 14 functional areas across all JTRS radios and waveforms. The Joint Staff, working as liaison with the Combatant Commanders, relayed how much trade space could be "negotiated" within each functional area.

In August 2005, the JPEO teamed with the Joint Staff, Services, NSA, JTRS program managers, and the OSD staff, to meet the Services' most pressing needs for networking capabilities with affordable options using trade space. The result of that collaboration was an agreed-to set of options for the JTRS program.

There was also consensus on threshold JTRS requirements, the highest priorities for the Services, for developing and fielding an initial mobile ad hoc networking capability.

In November 2005, Bauman briefed senior DoD leadership on the set of options for the JTRS program. The DoD leadership selected the option to develop transformational waveforms with selected Service high-priority legacy waveforms.

The FY 2007 President's Budget funds this \$4 billion development option for transformational network capabilities and Service high-priority waveforms, including the Wideband Networking Waveform, Soldier Radio Waveform, and Joint Airborne Networking-Tactical Edge.

Strategy to Achieve Requirements Within Budget

Implementing an acquisition strategy at the JPEO level means overseeing program execution in FY 2006 and a near-term execution strategy for FY 2007. The JPEO wants to tie both to an underlying business philosophy to execute the JTRS program with an enterprise approach that has four key elements:

✓ Government Purpose Rights (GPR): This is GPR for enterprise elements such as software, enabling reuse and application across the JTRS product lines. A key part of the GPR approach is use of the JTRS Information Repository that provides a “home” for posting application program interfaces (APIs); GPR source code; and documentation and models associated with JTRS software products.

The goal is to have the artifacts mentioned above available for use by other JTRS programs. The Repository will be available to industry vendors to maximize code reuse and portability. Currently, there are more than 3.5 million lines of code in the Repository, including 15 waveforms and two operating environments/core frameworks. The Repository is absolutely vital as the program focuses more intensely on interoperability across the respective warfighting domains.

✓ Open Systems Architecture Approach: This approach focuses on an overarching systems engineering model that will direct the performance, design specifications and standards for operation of the system. This includes enterprise-wide networking and an information assurance architecture where feasible.

The JPEO is pursuing an open systems architecture based on the Software Communications Architecture (SCA) that includes a set of defined JTRS APIs.

What is a form factor?

A form factor is the linear dimensions and configuration of a device, as distinguished from other measures of size.

The initial 26 form factors were reduced to the following 13.

- Ground Mobile Radio (GMR)
- Multifunctional Information Distribution System for JTRS (MIDS-J)
- Manpack
- Handheld
- Airborne, Maritime and Fixed Site Small Airborne (AMF-SA)
- AMF-MF (Maritime/Fixed Site)
- Small Form Factor A&H (for Intelligent Munitions Systems and Unattended Ground Sensors in the Future Combat System)
- SFF B, C and I (for Ground Soldier Systems)
- SFF D (for Aerial Systems)
- SFF J (for Networked Missile Launcher System in FCS)

✓ Moderate- to Low-Risk Acquisition Programs: One of the fundamental tenets of the JTRS restructure was to ensure program managers moved their respective programs from high to at least moderate risk, employing an incremental development approach. This also includes more stringent oversight of program costs, and frequently scheduled assessments of technical and schedule risks.

✓ Broaden Industry Involvement and Maximize Competition: Throughout the JTRS restructure the JPEO organization actively looked, and continues to look at existing technology to leverage commercial-off-the-shelf and government-off-the-shelf opportunities where appropriate. This encourages new ideas and technologies from a diverse set of industry sources.

Creating an Enduring Joint Organization that Balances Service Equities with DoD Enterprise Needs

The March 31, 2006, acquisition decision memorandum signed by Under Secretary Krieg contributes significantly to the JPEO's goal for a lasting joint organization. The memorandum directs replacing the former “Clusters” that had become separate disjointed programs with the centrally managed domain program management offices illustrated in Figure 2. The plan structure is comprised of three JTRS domains shown in Table 1.

“This new organizational approach gets us away from the original Service-centric approach to developing this joint capability, facilitating a more enterprise approach to things like systems engineering, common service implementations and gateways that cut across the warfighting domains. This organizational construct will increase our ability to effectively and efficiently develop and field joint capability and provides the basis for effective resource management and governance processes,” Bauman explained.

In terms of joint resource management, the Joint Program Executive Officer is centrally managing the RDT&E efforts for the JTRS enterprise in the outyears – FY 2007 and beyond. Once the JTRS program funding plan is approved, JPEO has full control

Table 1. The JTRS Domains	
Ground Domain	Ground Mobile Radio (GMR) (formerly Cluster 1) - Support requirements for Army and Marine Corps Ground Vehicular platforms Handheld/Manpack/Small Form Factor (HMS) (formerly Cluster 5) - Support requirements for JTRS handheld and manpack units and forms suitable for integration into platforms requiring a Small Form Fit radio
Airborne, Maritime and Fixed Domain	Airborne, Maritime and Fixed Site (AMF) - Support requirements for airborne (including rotary wing), maritime and fixed station platforms for all Services Multifunctional Information Distribution System–JTRS (MIDS-J) - Migrate the current MIDS-Low Volume Terminal to MIDS-JTRS compliance producing the next generation data link and communication terminal for joint and coalition tactical platforms
Network Enterprise Domain	Waveform Program Office - Responsible for waveform development, cryptographic equipment applications, architectural integrity of JTRS, gateways and common network services
Special Radio Systems	JTRS Enhanced Multi-Band, Inter/Intra Team Radio (MBITR) (formerly Cluster 2) - Managed by Special Operations Command - Support requirements for handheld radios for the Army, Navy, Marine Corps and Air Force Special Operations Forces

of those funds in the year of execution. This allows the JPEO to address funding priorities within the enterprise to the greatest extent possible and better support individual program stability.

"Going forward in FY 2007, my office will directly receive the total JTRS RDT&E allocation from the Army Budget Office under a single program element. I then will be empowered to oversee execution, providing me with instantaneous visibility into fiscal status for all JTRS developmental efforts. Again, this streamlined resource management process is vital while managing enterprise efforts across the Services and warfighting domains," Bauman elaborated.

The authority and responsibility for the procurement and sustainment of software-programmable radios reside with the individual Services who will determine unit quantities. Quantities will not be finalized until the results of the Program Objective Memorandum for 2008 are released and the Services' input into the Future Years Defense Program are known. In the meantime, a detailed independent unit cost estimate is currently being conducted.

In addition to effective resource management processes, the JPEO is charting an innovative approach to program governance. "DoD has come under some scrutiny as of late in terms of how we, as a DoD enterprise, manage our acquisition programs," Bauman said.

The Defense Acquisition Performance Assessment report, the Quadrennial Defense Review, various Government Accountability Office reports, as well as an independent JTRS assessment conducted by the former Air Force Chief of Staff Gen. Larry Welch earlier this year, have all highlighted the concerns with respect to the defense systems acquisition process and its inability to effectively control costs and deliver capability on schedule.

"Last summer, Secretary Krieg challenged me to come up with some ideas on how we can more effectively govern and manage joint programs. We did some in-depth studies; we looked hard at the lessons learned in earlier reports and presented a revised governance process to senior DoD leadership in February 2006. As part of our recommendations, we advocated using JTRS as a pilot for a revised governance process," Bauman explained.

The JPEO provided DoD senior leadership with core principles and key attributes that support a more streamlined approach to joint program governance. These principles and attributes are based on proven corporate models that drive industry.

In principle, executives must have freedom to responsibly drive the enterprise forward to meet the strategic direction. Overly burdensome restraints to this freedom have a high potential to negatively impact schedule, cost and risk. In accordance with their chartered responsibilities, executives need to be empowered to aggressively execute to agreed-to requirements. The governance process must also provide for effective accountability commensurate with the degree of executive freedom exercised.

An optimum governance process must be able to make the quick

decisions while balancing enterprise and stakeholder equities against the strategic direction. Effective oversight is achieved through effective communications and collaboration, resulting in an agile, efficient, and less onerous process.

"The streamlined process I proposed should increase the speed of decision making while still honoring the interests of the various stakeholders — in effect, it empowers a true Joint Program Executive Officer as intended. More importantly, it gets the right capability at the right time into the hands of our warfighters," Bauman concluded.

The JTRS governance process, though approved by DoD senior leadership, is not "written in stone" nor will it be applied to every joint program. "Based on some of the feedback from our stakeholders, we are working some of the details of the process," Bauman added.

JTRS and the Army's Future Combat System

JTRS will provide the Army warfighter with new, secure capabilities, which include the transmission and receipt of real-time information through voice and text, as well as the ability to stream live video/audio, draw/share maps, and allow video/audio conferencing.

The revised JTRS strategy fully supports the fielding of the GMR and HMS radios and their fit into the Army's Future Combat System. The FCS is an integrated suite of technology components that are part of the Army's transformational process to become a lighter, more agile force. The technology components will be dependent on JTRS for mobile networking, which is essential to the success of FCS.

The JPEO is taking an enterprise approach with FCS, adopting a moderate risk posture and specific business philosophies about government purpose rights of the software and competition in production on the hardware.

"We are synchronizing our program with the FCS and meeting the schedules that the Army has for Spinout 1, which is the first implementation of FCS. We consulted the Army and the FCS program. When I say 'we,' I am really talking about the big 'We' that includes the Joint Chiefs of Staff, Joint Staff Director for Command, Control and Communications, and the Joint Staff Director for Force Structure, Resources and Assessment. The Army and the FCS staffs have been an integral part of defining the requirements for Increment 1," Bauman said.

"We talk weekly, if not daily, with Maj. Gen. Charles Cartwright, Program Manager Future Combat Systems, who is my counterpart on FCS, and we have people collocated between our two programs working this very closely because we recognize the key dependency of FCS on the JTRS program," Bauman added.



For more information about the JPEO JTRS, go to the Space and Naval Warfare Systems Command (SPAWAR) Web site at <http://spawar.navy.mil> and click on the JPEO JTRS program seal. CHIPS